WHAT IS CLAIMED IS:

1. A method of controlling an element within a patient's body which is responsive to a magnetic field, the method comprising applying at least two different magnetic fields to the element within the body to control the element, the magnetic fields having different angular relationships between the field direction and the gradient.

2. The method according to claim 1 wherein in one of the magnetic fields applied to the element, the gradient is substantially parallel to the field direction and wherein in another of the magnetic fields applied to the element the gradient is substantially perpendicular to the field direction.

3. The method according to claim 2 wherein one of the fields applied to the element is an end field of a permanent magnet and one of the fields applied to the element is a side field of a permanent magnet.

4. The method according to claim 3 wherein the permanent magnet is a multipole permanent magnet.

5. The method according to claim 4 wherein the multipole permanent magnet is a quadrupole permanent magnet.

6. The method according to claim 1 wherein the magnet fields are applied with at least one permanent magnet.

7. The method according to claim 1 wherein the magnetic fields are applied with at least one permanent magnet.

8. The method according to claim 7 wherein the at least two fields are applied to the element by changing at least one of the position and orientation of the magnet with respect to the patient.

9. The method according to claim 1 wherein the magnetic fields are applied with at least one electromagnetic coil.

10. The method according to claim 9 wherein the at least two fields are applied to the element by changing at least one of the position and orientation of the magnet with respect to the patient.

11. The method according to claim 10 wherein the magnetic fields are applied with at least one superconducting electromagnetic coil.

12. The method according to claim 11 wherein the at least two fields are applied to the element by changing at least one of the position and orientation of the magnet with respect to the patient.

13. An improved method of controlling an element within a patient's body which is responsive to a magnetic field through the controlled application of magnetic fields, the improvement comprising successively applying at least two different magnetic fields in which the angle between the magnetic field direction and the gradient are different.

14. A method of controlling an element within the human body which is responsive to an applied magnetic field, the method comprising applying a series of magnetic fields including fields in which the magnetic gradient is negligible for orienting the element along the field direction and fields in which the magnetic gradient is non-negligible and oblique to the magnetic field direction for pulling the element in a direction different from the orientation of the element.

15. A method of controlling an element with the human body which is responsive to an applied magnetic field, the method comprising applying a series of magnetic fields to control the element including fields in which the direction and strength of the magnetic gradient is negligible for orienting the element along the field direction and fields in which the magnetic gradient is non-negligible and oblique to the magnetic field direction for pulling the element in a direction different from the orientation of the element.

16. A device for magnetically assisted surgery of a patient comprising:

a magnet support structure;

a magnet having at least four poles, the magnet attached to the magnet support structure so that the magnet provides a near-field magnetic field in an operating region within a patient, the magnet being moveable to alter a direction of magnetic field lines in the operating region within the patient.

17. The device of claim 16 wherein the magnet is a quadrupole magnet.

18. The device of claim 17 wherein the magnet is a permanent magnet.

19. The device of claim 18 wherein the magnet is generally cylindrical and has a radius and an axis perpendicular to its radius.

20. The device of claim 19 wherein the magnet comprises a pair of essentially semicircular segments joined so that the segments attract each other and provide, in a region proximate the magnet disk, a magnetic field essentially parallel to the magnet disk along the axis of the magnet.

21. The device of claim 19 wherein the magnet is mounted rotatably on its axis so that a direction of magnetic field lines in the operating region of the patient may be varied.

22. The device of claim 21 and wherein the magnet is mounted translatably in at least one radial direction.

23. The device of claim 22 wherein the magnet is mounted so that it is translatable in a plurality of radial directions.

24. The device of claim 23 and further comprising a medical imaging system configured to provide a medical image of the operating region of the patient.

25. The device of claim 24 wherein the medical imaging system comprises an x-ray source and an x-ray imaging plate on opposite sides of the operating region of the patient, and further wherein the x-ray source and

x-ray imaging plate are positioned in a region entirely on one side of a face of the magnet.

26. The device of claim 17 wherein the magnet is a NdFeB maximum energy product.

27. The device of claim 26 wherein the magnet has a 44 MgOe composition.

28. The device of claim 27 wherein the magnet is disk-shaped and has a radius of about 12.39 inches and a thickness of 6.20 inches.

29. The device of claim 28 wherein the magnet provides a field of at least about 0.15 Tesla at 6 inches from its face.

30. The device of claim 1 wherein the magnet comprises at least one electromagnetic coil.

31. The device of claim 30 wherein the magnet comprises a continuously wound coil with a cross-over to provide a quadrupole or higher-order magnetic field.

32. The device of claim 30 wherein the magnet comprises at least a pair of separately wound electromagnetic coils.

33. The device of claim 32 wherein the coils are each shaped in the form of a pie section and assembled into a circular configuration.

34. The device of claim 33 wherein the pair of separately wound electromagnetic coils are D-shaped, with

a flat portion of each of the D-shaped coils adjacent one another.

35. The device of claim 30 wherein the at least one coil is superconducting.

36. A device for magnetically assisting surgical operations, the device comprising:

a magnetic delivery vehicle configured to be introduced into a patient;

a magnet support base; and

a magnet assembly adjustably supported on the support base and positionable thereon to provide a magnetic field of specified direction and having an transverse gradient at a location in which the magnetic delivery vehicle is introduced into a patient supported by the patient support structure.

37. The device of claim 36 wherein the magnet assembly comprises a computer-controlled robotic arm having a magnetic effector.

38. The device of claim 37 and further comprising a medical imaging device configured to provide a relative location and orientation of the magnetic delivery vehicle, the magnet assembly, and the operating region of the patient.

39. A compound magnet having a front face and comprising a plurality of segments, the segments each magnetized to provide the maximum magnetic field in a selected direction at a selected operating point spaced from the front face of the magnet.

40. The compound magnet according to claim 39 wherein each segment is magnetized in the direction of magnetization that, at the center of mass of the segment, provides the maximum contribution to the magnetic field in the selected direction at the selected operating point.

41. A magnet having a front and a back face and comprising a plurality of segments, the segments each magnetized to provide substantially the maximum magnetic field in a selected direction at an operating point spaced from the front face, the back face being substantially contoured to follows a surface of constant contribution to magnetic field in the selected direction at the operating point.

42. The magnet according to claim 41 wherein each segment has a front face oriented toward the front face of the magnet, a rear face oriented toward the rear face of the magnet, and a sidewall, comprising at least one side, therebetween, the sides configured to converge toward the operating point.

43. The magnet according to claim 42 wherein the magnet comprises a plurality of layers of segments between the front face and the back face.

44. The magnet according to claim 43 wherein each layer is substantially bounded by a surface of constant contribution to the magnetic field in the selected direction at the operating point.

45. A magnet for applying magnetic field in a selected direction at a selected operating point, the magnet comprising a front face generally facing the operating point, and a back face facing away from the operating point, the back face generally conforming to a constant contribution surface of the magnetic field in the selected direction.

46. The magnet according to claim 45 wherein the magnet is divided into a plurality of segments.

47. The magnet according to claim 46, wherein each segment comprises a front face, generally facing the operating point, the back face generally facing away from the operating point, the back face generally conforming to a constant contribution surface of the magnetic field in the selected direction.

48. The magnet according to claim 46 wherein each segment further has a sidewall comprising at least one side extending between the front face and the back face, and wherein the sidewalls converge toward the operating point.

49. The magnet according to claim 48 wherein there are a plurality of layers of segments, each layer generally conforming to a range of constant contribution to the magnetic field in the selected direction.

50. The magnet according to claim 48 wherein each segment is magnetized in the direction of magnetization that, at the center of mass of the segment, provides the maximum contribution to the magnetic field in the selected direction at the selected operating point.

51. The magnet according to claim 47 wherein each segment is magnetized in the direction of magnetization that, at the center of mass of the segment, provides the maximum contribution to the magnetic field in the selected direction at the selected operating point.

52. The magnet according to claim 48 wherein each segment is magnetized in the direction of magnetization that, at the center of mass of the segment, provides the maximum contribution to the magnetic field in the selected direction at the selected operating point.

53. The magnet according to claim 49 wherein each segment is magnetized in the direction of magnetization that, at the center of mass of the segment, provides the maximum contribution to the magnetic field in the selected direction at the selected operating point.

54. The magnet according to claim 49 wherein the selected operating point is at least six inches from the front face of the magnet.

55. The magnet according to claim 49 wherein the selected operating point is at least eight inches from the front face of the magnet.

56. The magnet according to claim 49 wherein the front face is substantially flat.

57. A magnet for applying a magnetic field in a selected direction at a selected operating point, the magnet having a generally flat front face facing the operating point, a curved back face facing away from the

operating point, the magnet comprising a plurality of segments, each of which is magnetized in the direction that, at the center of mass of the segment, provides the maximum contribution to the magnetic field in the selected direction at the selected operating point.